C1, TC 1-212

Change 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 23 December 2002

AIRCREW TRAINING MANUAL
UTILITY HELICOPTER, UH-60/EH-60

1. Change TC 1-212, 8 March 1996, as follows.

Remove old pages	Insert new pages
v and vi	v and vi
6-19 through 6-26	6-19 through 6-26.18
Glossary-1 through Glossary-12	Glossary-1 through Glossary-12
Reference-1 through Reference-8	Reference-1 through Reference-8
Index-1 through Index-8	Index-1 through Index-8
DA Form 5701-R, Sep 92 UH-60/AH-64 Performance Planning Card (PPC) (Front)	DA Form 5703-R, UH-60 Performance Planning Card (Front)
DA Form 5701-R, Sep 92 UH-60/AH-64 Performance Planning Card (PPC) (Back)	DA Form 5703-R, UH-60 Performance Planning Card (Back)

2. A star △ marks new or changed material.

3. File this transmittal sheet in the front of the publication.

4. The effective date of Change 1 is 15 January 2003.

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlisted.

By Order of the Secretary of the Army:

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DISTRIBUTION:
Active Army, Army National Guard, and U. S. Army Reserve: To be distributed in accordance with the initial distribution number 113889, requirements for TC 1-212.

PREFACE

The ATMs are basic documents that standardize aircrew training programs and flight evaluation procedures. This manual provides specific guidelines for executing UH-60/EH-60 aircrew training. It is based on the battle-focused training principles outlined in FM 25-101. It establishes crewmember qualification, refresher, mission, and continuation training and evaluation requirements. This manual applies to all UH-60/EH-60 crew members and their commanders and standardization officers.

Used with TC 1-210, this manual will help aviation commanders at all levels develop a comprehensive aircrew training program. By using the ATMs, commanders ensure that individual crew member and aircrew proficiency is commensurate with their units' mission. They also ensure that aircrews routinely employ standard techniques and procedures.

UH-60/EH-60 crew members will use this manual as a "how to" source for performing crew member duties. It provides performance standards and evaluation guidelines so that crewmembers know the level of performance expected and how that will be determined. Each task has a description that describes how it should be done to meet the standard.

Standardization officers, evaluators/trainers, and unit trainers will use this manual, along with TC 1-210, as a primary tool to assist the commander in implementing his aircrew training program. It provides the minimum performance standards to which they must train and evaluate crewmembers.

If differences exist between the maneuver descriptions in TM 1-1520-237-10 and this manual, this manual is the governing authority for training and flight evaluation purposes. Implementation of this manual conforms to AR 95-1 and TC 1-210. If a conflict exists between this manual and TC 1-210, TC 1-210 takes precedence.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 through the aviation unit commander to Commander, US Army Aviation Center, ATTN: ATZQ-ATB-ATM, Fort Rucker, AL 36362-5218.

This publication implements portions of STANAG 3114 (Edition Six)/Air Standard 60/16, Aeromedical Training of Flight Personnel.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

This publication has been reviewed for operations security considerations.

REFERENCES: Appropriate common references plus the following:

FAR/host-country regulations
FM 1-230
TM 1-1520-237-10

TASK 1003
Verify aircraft weight and balance.

CONDITIONS: Given mission cargo and passenger data and completed DD Forms 365-4 from the aircraft log book.

STANDARDS: Appropriate common standards plus verify that CG and gross weight remain within limits for the duration of the flight per TM 1-1520-237-10.

DESCRIPTION: Using the completed DD Forms 365-4 from the aircraft logbook, verify that aircraft gross weight and CG will remain within the allowable limits for the entire flight. Note gross weight and/or loading restrictions/aircraft limitations. If there is no completed DD Form 365-4 that meets mission requirements, refer to the unit weight and balance technician or TM 55-1500-342-23.

REFERENCES:

AR 95-1
TM 1-1520-237-10
TM 55-1500-342-23

△TASK 1004
Prepare a performance planning card.

CONDITIONS: Given a blank DA Form 5703-R (UH-60 Performance Planning Card), mission conditions, UH-60 engine torque factors, and aircraft basic weight.

NOTE 1: The charts in the AMCOM approved TM 1-1520-237-10, TM 1-1520-237-CL, TM 1-1520-253-10, and TM 1-1520-253-CL or the AMCOM approved performance planning software must be used for performance planning.

NOTE 2: Tabular performance data usage and values are explained at the end of the task DESCRIPTION.

STANDARDS: Appropriate common standards plus these additions/modifications:

1. Determine performance planning data necessary to complete the mission.

2. Determine when use of DA Form 5703-R is required.

3. Compute torque values ±2 percent.

4. Compute gross weight values ±500 pounds.

5. Compute fuel flow ±100 pounds per hour.

6. Compute airspeeds ±5 KIAS.

7. Correctly determine maximum torque available, maximum allowable gross weight (OGE), and GO/NO-GO (OGE) using tabular data found in the -CL.

DESCRIPTION:

1. Crew Duties. The PC will compute or direct other rated crew members to compute the aircraft performance data required to complete the mission. He will verify the computations and ensure aircraft performance meets mission requirements, and aircraft limitations will not be exceeded.

2. Procedures.

a. Determine and have available aircraft performance data required to complete the mission. DA Form 5703-R may be used as an aid to organize performance planning data required for the mission. This form will be completed, in its entirety, for the following:

(1) RL progression training, annual ATP evaluations, and when required during other training and evaluations.

(2) When the planned or actual aircraft gross weight for departure and/or arrival is within 3,000 pounds of the maximum allowable gross weight OGE or when the planned or actual gross weight is within 3,000 pounds of the maximum allowable gross weight for cruise. To determine if the DA Form 5703-R must be completed, perform the following procedures:

Step 1: DEPARTURE - Compare the maximum allowable gross weight for departure from either the -CL tabular data or appropriate -10 HOVER chart with the planned or actual aircraft gross weight.

Step 2: CRUISE – Compare the maximum allowable gross weight for cruise from the appropriate -10 CRUISE chart with the planned or actual aircraft gross weight.

Step 3: ARRIVAL - Compare the maximum allowable gross weight for arrival from either the -CL tabular data or appropriate -10 HOVER chart with the planned or actual aircraft gross weight.

NOTE 1: If the dual-engine maximum torque available exceeds a torque limit, use the tabular data equal to the torque limit, or enter the CRUISE chart at the torque limit line.

NOTE 2: If the maximum torque available line used on a CRUISE chart is to the right of the -10, Chapter 5 maximum gross weight limitation line, use the maximum gross weight limit line.

b. When a significant change in the mission's conditions occurs, recompute all affected values. A significant change is defined as any one of the following:

(1) An increase of over 10 degrees C, 2,000 feet PA, and/or 1,000 pounds gross weight.

(2) An increase or decrease of an ETF by 0.03 or more.

NOTE: An increase or decrease of .03 ETF, normally caused by inaccurate information or a change in aircraft, can significantly enhance or degrade single engine performance under certain conditions. Therefore, when the ETF is different than the planned value, an update of all affected values is required.

c. The data presented in the performance charts in the -10 are primarily derived for either a "clean" or "high drag" aircraft. When the external equipment or configuration differs significantly from the "clean" or "high drag" configuration, a drag compensation will be made. This configuration is referred to as the "alternative or external load" configuration and the appropriate drag compensation is described.

d. The procedures for determining performance planning data are the same for the UH-60A/L, UH-60Q/HH-60L and EH-60A aircraft unless specifically noted in the appropriate items.

e. DEPARTURE. (Figures 6-5 and 6-6 show the numerical sequence of each task item for completing DA Form 5703-R (front and back).

(1) PA. Record forecast maximum pressure altitude for the mission and pressure altitude for time of departure.

(2) FAT. Record forecast maximum free air temperature for the mission and free air temperature for time of departure.

NOTE: Maximum pressure altitude and temperature will be used when computing all items in the departure section except item 13. Item 13 will be computed using forecast temperature and PA at time of departure.

(3) AIRCRAFT GWT. Record planned aircraft gross weight at takeoff. This includes the aircraft basic weight, internal load, total fuel, and when applicable, ESSS stores (exclude sling load).

(4) FUEL WEIGHT. Record total planned fuel weight (internal and/or external) at takeoff.

(5) STORES WEIGHT. Record the planned jettisonable weight of the ESSS stores.

(6) SLING WEIGHT. Record the planned weight of the sling load.

(7) ATF/ETF. Record the ATF and ETFs in the appropriate blocks.

(8) TR. Use the aircraft TORQUE FACTOR chart to compute torque ratios as described below.

Step 1: Enter the appropriate aircraft TORQUE FACTOR chart on the left at the appropriate temperature. Move right to the ATF or ETF.

Step 2: Move straight down to the bottom of the chart, note the TORQUE RATIO ~ TR. Record the **TR**.

(9) MAX TORQUE AVAILABLE. Use the appropriate MAXIMUM TORQUE AVAILABLE chart to compute engine specification torque available as described below.

NOTE 1: The maximum torque available is also referred to as INTERMEDIATE RATED POWER (IRP) – 10 OR 30 MINUTE LIMIT.

NOTE 2: Certain temperature and pressure altitude combinations will exceed -10, Chapter 5 torque limitations. This item represents actual maximum torque available values. During aircraft operations, -10, Chapter 5 torque limitations shall not be exceeded.

(a) T700-GE-700 engines.

Step 1: Enter the MAXIMUM TORQUE AVAILABLE chart at the appropriate temperature then move right to the appropriate PRESSURE ALTITUDE ~ 1000 FT.

Step 2: Move down and read the SPECIFICATION TORQUE AVAILABLE PER ENGINE ~ %.

Step 3: If the ATF or ETF is less than 1.0, multiply the specification torque by the torque ratio to obtain maximum torque available. An alternate method is to continue down to the TORQUE RATIO, item 8. Move left to read the maximum TORQUE AVAILABLE ~ % per engine. Record **MAX TORQUE AVAILABLE**.

NOTE: Adjust maximum torque available as required for planned use of engine anti-ice and/or cockpit heater according to the -10.

(b) T700-GE-701C engines.

NOTE 1: The maximum torque available – 2.5 minute limit is also referred to as SINGLE-ENGINE CONTINGENCY POWER – 2.5-MINUTE LIMIT.

Step 1: Enter the MAXIMUM TORQUE AVAILABLE – 10-MINUTE LIMIT chart for dual-engine and 2.5-MINUTE LIMIT chart for single-engine at the appropriate FREE AIR TEMPERATURE (FAT) ~ °C.

Step 2: Move right to the appropriate PRESSURE ALTITUDE ~ 1000 FT. line then move down and read the TORQUE AVAILABLE PER ENGINE ~ %.

Step 3: If the ATF or ETF is less than 1.0, multiply the SPECIFICATION TORQUE by the TORQUE RATIO to obtain maximum torque available.

Step 4: An alternate method is to enter the bottom of the TORQUE CONVERSION chart at the TORQUE AVAILABLE PER ENGINE (SPECIFICATION TORQUE) ~ %. Move up to the torque ratio, item 8, then left to read ACTUAL TORQUE AVAILABLE ~ %. Record **MAX TORQUE AVAILABLE**.

NOTE 2: Adjust the maximum torque available as required for planned use of engine anti-ice and/or cockpit heater according to the -10.

(10) MAX ALLOWABLE GWT OGE / IGE. Use the appropriate HOVER chart to compute maximum allowable gross weight for OGE/IGE as described below. Annotate the computed maximum allowable gross weight OGE/IGE or the maximum gross weight per -10, Chapter 5, whichever is less.

NOTE: If OGE capability does not exist, the MAX HOVER HEIGHT IGE, item 12, must be computed.

(a) MAX ALLOWABLE GWT OGE / ...

Step 1: Enter the HOVER chart at the TORQUE PER ENGINE ~ % (OGE) at the DUAL-ENGINE MAX TORQUE AVAILABLE, item 9, then move right to the GROSS WEIGHT ~ 1000 LB chart. If the dual-engine maximum torque available exceeds transmission torque limits, use the DUAL ENGINE TRANS LIMIT line to compute the maximum allowable gross weight OGE.

Step 2: Reenter the HOVER chart at the appropriate FREE AIR TEMP ~ °C and move right to the appropriate PRESSURE ALTITUDE ~ 1000 FT, then move down to the GROSS WEIGHT ~ 1000 LB chart. Read the maximum allowable gross weight OGE at the intersection of this step and step 1 above. Record the **MAX ALLOWABLE GWT OGE / ...**.

(b) MAX ALLOWABLE GWT ... / IGE.

Step 1: Enter the HOVER chart at the TORQUE PER ENGINE ~ % (IGE) at the DUAL-ENGINE MAX TORQUE AVAILABLE, item 9, then move up to the desired IGE WHEEL HEIGHT ~ FT (normally the 10-ft line), then move right to the GROSS WEIGHT ~ 1000 LB chart. If the dual-engine maximum torque available exceeds transmission torque limits, use the DUAL ENGINE TRANS LIMIT line to compute the maximum allowable gross weight IGE.

Step 2: Reenter the HOVER chart at the appropriate FREE AIR TEMP. ~ °C and move right to the appropriate PRESSURE ALTITUDE ~ 1000 FT then move down to the GROSS WEIGHT ~ 1000 LB chart. Read the maximum allowable gross weight IGE at the intersection of this step and step 1 above. Record the **MAX ALLOWABLE GWT ... / IGE**.

(11) GO/NO-GO TORQUE OGE / IGE. Use the appropriate HOVER chart as described below.

(a) OGE. Use maximum allowable gross weight OGE, item 10.

(b) IGE. Use maximum allowable gross weight IGE, item 10.

NOTE : GO/NO-GO is computed using the maximum forecast pressure altitude and temperature for the mission. When the actual temperature is less than maximum, the torque required to hover at a given gross weight is less. To ensure that structural limits are not exceeded, or that OGE capabilities exist at maximum forecast temperature, reduce GO/NO-GO by 1% for each 10 °C that actual temperature is less than maximum forecast temperature.

Step 1: Enter the chart at the appropriate FREE AIR TEMP ~ °C.

Step 2: Move right to the appropriate PRESSURE ALTITUDE ~ 1000 FT.

Step 3: Move down to the weight(s) computed for item 10.

Step 4: Move left to the 10-foot hover line (or WHEEL HEIGHT ~ FT that will be used to check the GO/NO-GO).

Step 5: Move down to read the GO/NO-GO torque value(s). Record the **GO/NO-GO TORQUE OGE / IGE**.

(12) MAX HOVER HEIGHT IGE. If OGE capability does not exist, use the appropriate HOVER chart to compute the MAX HOVER HEIGHT IGE, as described below.

Step 1: Enter the HOVER chart at the appropriate FREE AIR TEMP ~ °C and move right to the appropriate PRESSURE ALTITUDE ~ 1000 FT, then move down to the take-off GW ~ 1000 LB, item 3 (plus sling load weight, item 6, if applicable), then move left to the WHEEL HEIGHT ~ FT lines.

Step 2: Reenter the bottom of the HOVER chart at the TORQUE PER ENGINE ~ % (IGE) at the DUAL-ENGINE MAX TORQUE AVAILABLE, item 9, then up to the intersection from step 1 above. Interpolate hover height as required. Record the **MAX HOVER HEIGHT IGE**.

(13) PREDICTED HOVER TORQUE. Use the appropriate HOVER chart as described below for torque required to hover. Use AIRCRAFT GWT, item 3, and current PA, item 1, and FAT, item 2.

(a) Predicted hover torque (DUAL-ENGINE). Compute the torque the same as for item 11 above using the AIRCRAFT GWT, item 3, instead of the MAX ALLOWABLE GWT. Record **DUAL-ENGINE PREDICTED HOVER TORQUE**.

(b) Predicted hover torque (SINGLE-ENGINE). Double the PREDICTED HOVER TORQUE value that was computed in step (a) above. If the value exceeds the appropriate MAX TORQUE AVAILABLE, item 9, single-engine, record NA in the appropriate block(s). Record **SINGLE-ENGINE PREDICTED HOVER TORQUE**.

(14) MIN SE - IAS - W/O STORES / W/STORES. Use the appropriate CRUISE chart for the minimum single-engine airspeed with external stores and without external stores as described below.

NOTE 1: If the aircraft will be operating without external stores, record NA in the w/stores block.

NOTE 2: External stores are defined as a sling load, ESSS wing stores, or both.

Step 1: Enter the bottom of the CRUISE chart at one-half the SINGLE-ENGINE MAX TORQUE AVALABLE, item 9, for the low ETF engine, but no more than one-half of the TRANSMISSION TORQUE LIMIT.

Step 2: Move up to the first intersection of aircraft gross weight (without external stores). Read left or right for the IAS ~ KTS. Record **MIN SE – IAS – W/O STORES /...**.

NOTE 3: If aircraft will be operating with external stores, proceed with steps 3 and 4 below.

Step 3: Enter the bottom of the appropriate CRUISE chart at one-half the SINGLE-ENGINE MAX TORQUE AVAILABLE, item 9, for the low ETF engine, but no more than one-half of the TRANSMISSION TORQUE LIMIT.

Step 4: Move up to the first intersection of aircraft gross weight (with external stores). Read left or right for the IAS ~ KTS. Record **MIN SE – IAS – ... / W/STORES**.

(15) ZERO FUEL WEIGHT: Use the appropriate HOVER chart from the -CL to compute the adjusted ZERO FUEL WEIGHT as described below.

NOTE 1: The zero fuel weight on the DD Form 365-4 is computed using standard, average or estimated weight for personnel, equipment and fuel. Actual weights may vary greatly from those on the DD Form 365-4. It is also unrealistic to predict all possible configurations that may be encountered on every mission. As a result, it may be necessary to compute an adjusted ZERO FUEL WEIGHT. The method to determine adjusted ZERO FUEL WEIGHT or to validate the DD Form 365-4 zero fuel weight is described below.

Step 1: Note free air temperature, pressure altitude, and total indicated fuel weight.

Step 2: While at a hover, note wheel height and hover torque.

Step 3: Enter the HOVER chart at the noted FREE AIR TEMP ~ °C. Move right to the noted PRESSURE ALTITUDE ~ 1000 FT then down to the GROSS WEIGHT ~ 1000 LB chart.

Step 4: Reenter the HOVER chart at the TORQUE PER ENGINE ~ % (IGE) at the noted hover torque. Move up to the WHEEL HEIGHT ~ FT to the noted hover height then move right to the intersection of step 3 above. Note aircraft gross weight.

Step 5: Subtract the noted total indicating fuel weight from the gross weight computed in step 4 above. Record the adjusted **ZERO FUEL WEIGHT**.

NOTE 2: Although data needed to compute ZERO FUEL WEIGHT is noted at a hover, the calculation may be made on the ground or, if not practical, shortly after takeoff or level off.

(16) REMARKS: Record appropriate mission information such as drag factors, fuel requirements, and GO/NO-GO for sling loads.

NOTE: The GO/NO-GO TORQUE for sling loads is determined by using the same process as item 11 above, using the MAX ALLOWABLE GWT OGE / … and a hover height that suspends the load approximately 10 feet AGL.

f. CRUISE.

(1) PA. Record planned cruise pressure altitude.

(2) FAT. Record forecast temperature at the planned cruise pressure altitude.

(3) TR. Use the TORQUE FACTOR chart to compute torque ratios, if required. The torque ratio is computed the same as item 8, DEPARTURE data, using cruise temperature instead of departure temperature.

NOTE: The maximum torque available values found in the cruise charts of the -10 and the tabular performance data of the -CL are adjusted for torque ratio.

(4) MAX TORQUE AVAILABLE. Compute maximum torque available for dual- and single-engine the same as item 9, DEPARTURE data, using cruise temperature and pressure altitude.

NOTE 1: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the -10.

NOTE 2: Maximum torque available can be derived from the CRUISE chart by referencing the TORQUE AVAILABLE ~ 30-MINUTE ATF 1.0 and/or 0.9 line, if shown. If the ATF or ETF is between these values, interpolation is required. The maximum torque available – 30-minute limit for the T-700 engine and the 10-minute limit for the T-701C can also be derived from the tabular data in the -CL. If the ATF is between 1.0 and 0.9, interpolation is required.

(5) CT (critical torque). Record the value of one half the maximum torque available of the engine with the lowest ETF.

NOTE: CT is the dual-engine torque value, which when exceeded, may not allow the aircraft to maintain % RPM R within normal limits under single-engine operations in the same flight conditions.

WARNING: During dual-engine flight, conditions that require torque settings greater than the critical torque indicates the pilot is operating outside the aircraft low ETF single-engine capability. If operating dual-engine above the CT and an engine fails, malfunctions or must be shut down; the pilot, in these circumstances, must immediately adjust torque, airspeed and or gross weight to establish single-engine capability.

(6) MIN / MAX Vh – IAS (DUAL-ENGINE). Use the appropriate CRUISE chart to compute the minimum/maximum Vh indicated airspeeds as described below.

(a) Clean and high drag configuration.

Step 1: Enter the bottom of the CRUISE chart at the MAX TORQUE AVAILABLE, item 4, CRUISE data.

Step 2: Move up to the first intersection of AIRCRAFT GWT, item 3, DEPARTURE data. Read left or right for minimum IAS ~ KTS. Record the **DUAL-ENGINE MIN / … Vh – IAS**. If the maximum torque available line is right of the gross weight line, record 0 for the **MIN / … Vh - IAS**.

Step 3: Continue up to the second intersection of AIRCRAFT GWT, item 3, DEPARTURE data. Read left or right for maximum Vh IAS ~ KTS. Record the **DUAL-ENGINE … / MAX Vh – IAS**.

NOTE: If the maximum torque available line is to the left of (does not intersect) the AIRCRAFT GWT, item 3, DEPARTURE data, the aircraft cannot maintain dual-engine level flight for the conditions. Item 18 must be computed and a new cruise altitude selected.

(b) Alternative or external load configuration.

NOTE 1: For alternative or external load configurations, refer to the -10, Chapter 7, Section VI, DRAG. Determine and add together the appropriate Drag Multiplying Factors.

NOTE 2: The torque change to compensate for drag (alternative or external load configuration) at minimum Vh IAS is often negligible and not computed. The dual-engine maximum Vh indicated airspeed is adjusted for alternate or external load configuration as follows:

Step 1: Enter the CRUISE chart at maximum Vh IAS ~ KTS, (a) step 3 above, then left or right to the curved dashed line then move up to read Δ TRQ ~ % FOR DRAG AREA OF 10 SQ FT of ΔF.

Step 2: Multiply the Δ TRQ times the drag multiplying factor. Subtract the result from the maximum torque available used initially in (a) step 1 above.

Step 3: Reenter the bottom of the CRUISE chart at the adjusted torque value and move up to the second intersection of AIRCRAFT GWT, item 3, DEPARTURE data. Read left or right for maximum Vh IAS. Record the adjusted **DUAL-ENGINE .../MAX Vh – IAS**.

NOTE 3: If the adjusted maximum torque available line is to the left of (does not intersect) the AIRCRAFT GWT, item 3, DEPARTURE data, the aircraft cannot maintain dual-engine level flight for the conditions. Item 18 must be computed and a new cruise altitude selected.

(7) CRUISE - IAS / TAS (DUAL-ENGINE). Record planned **CRUISE – IAS / ...** (inner IAS ~ KTS scale). Enter the CRUISE chart at cruise IAS and move laterally to the outer TRUE AIRSPEED ~ KTS scale. Record **DUAL-ENGINE CRUISE - ... / TAS**.

(8) CRUISE/CONTINUOUS TORQUE (DUAL-ENGINE). Use the appropriate CRUISE chart to compute the torque required for cruise and continuous torque available as described below.

NOTE: The continuous torque available is also referred to as MAXIMUM CONTINUOUS POWER (MCP).

(a) Clean and high drag configuration.

Step 1: Enter the CRUISE chart at the selected cruise IAS in item 7 above. Move left or right as appropriate to the aircraft GW ~ 1000 LB, item 3 (plus sling load weight, item 6, if applicable), DEPARTURE data.

Step 2: Move down to the TORQUE PER ENGINE ~ % line to read the CRUISE torque. Record the **DUAL-ENGINE CRUISE / ... TORQUE**.

Step 3: Renter the CRUISE chart at the selected cruise IAS in item 7 above. Move left or right as appropriate to the TORQUE AVAILABLE - CONTINOUS line.

Step 4: Move straight down (do not follow the slant of the line) to the TORQUE PER ENGINE ~ % to read the CONTINUOUS torque. Record the **DUAL-ENGINE ... / CONTINUOUS TORQUE**.

NOTE 1: If the selected CRUISE ~ IAS line is below the depicted TORQUE AVAILABLE – CONTINOUS line, use the torque value indicated by the lowest extreme of the TORQUE AVAILABLE ~ CONTINUOUS line.

NOTE 2: Adjust CRUISE / CONTINUOUS TORQUE for planned use of engine anti-ice and/or heater.

(b) Alternative or external load configuration.

Step 1: Enter the appropriate CRUISE chart at the IAS in item 7 above, then move left or right as appropriate to the curved dashed line. Move up to read the Δ TRQ ~ % FOR DRAG AREA OF 10 SQ FT OF ΔF.

Step 2: Multiply the Δ TRQ ~ % by the drag multiplying factor.

Step 3: Add or subtract the value in step 2 to/from the uncorrected clean or high drag cruise/continuous torque values in (a) steps 2 and 4 above (do not exceed the dual-engine transmission torque limit). Record the adjusted **CRUISE / CONTINUOUS TORQUE**.

NOTE: If the adjusted torque value exceeds the dual-engine transmission torque limit, use the dual-engine transmission torque limit and adjust cruise airspeed.

(9) CRUISE FUEL FLOW (DUAL-ENGINE).

(a) Cruise chart method. Use the appropriate CRUISE chart.

Step 1: Enter the bottom of the chart at the cruise torque value computed in item 8 above.

Step 2: Move up to TOTAL FUEL FLOW ~ 100 LB/HR and read cruise fuel flow. Record the **DUAL-ENGINE CRUISE FUEL FLOW**.

NOTE: Adjust as required for planned use of engine anti-ice and cockpit heater according to the -10.

(b) Engine fuel flow chart method. Use the SINGLE/DUAL-ENGINE FUEL FLOW chart.

Step 1: Enter the chart at the INDICATED TORQUE PER ENGINE ~ % for the cruise torque value computed in item 8 above.

Step 2: Move right to the cruise PRESSURE ALTITUDE ~ 1000 FT.

Step 3: Move up to the DUAL-ENGINE FUEL FLOW ~ LB/HR line and read cruise fuel flow. Record the DUAL ENGINE **CRUISE FUEL FLOW**.

NOTE: Adjust as required for FAT and/or planned use of engine anti-ice and cockpit heater according to the -10.

(10) MAX END - IAS / TORQUE and **MAX RANGE - IAS / TORQUE.** Use the appropriate CRUISE chart to compute maximum endurance indicated airspeed/torque and maximum range indicated airspeed/torque as described below.

(a) Clean and high drag configuration.

Step 1: Enter the bottom of the appropriate CRUISE chart at AIRCRAFT GWT, item 3, DEPARTURE data. Move up along the gross weight line to the intersection of the gross weight line and the MAX END AND R/C line. Move left or right as required to the IAS ~ KTS value then read maximum endurance indicated airspeed. Record **MAX END – IAS/…**. Move down to the TORQUE PER ENGINE ~ % line, then read torque for the maximum endurance indicated airspeed. Record **MAX END - … / TORQUE**.

Step 2: Continue up along the gross weight line to the intersection of the gross weight line and the MAX RANGE line. Move left or right as required to the IAS ~ KTS value, then read maximum range indicated airspeed. Record **MAX RANGE – IAS / …**. Move down to the TORQUE PER ENGINE ~ % line, then read torque for the maximum range indicated airspeed. Record **MAX RANGE - … / TORQUE**.

(b) Alternative or external load configuration.

NOTE 1: The torque change to compensate for drag (alternative or external load configuration) at MAX END – IAS is often negligible and not computed.

NOTE 2: Maximum range airspeed is adjusted for alternative or external load configurations as follows:

Step 1: Insert the indicated change in flat plate drag ($\Delta F\ ft^2$) into the formula found in the -10, Chapter 7, Section IV, (6 Kts/10 $ft^2 X \Delta F\ ft^2$ = N Kts) to derive the change in maximum range IAS. See example in the -10, Chapter 7, Section IV.

Step 2: Subtract the IAS change in (b) step 1 above from (a) step 2 above. Record the adjusted **MAX RANGE – IAS / …**.

(11) MAX R/C - IAS / TORQUE. Use the MAX END – IAS, item 10 above, and desired torque setting as described below.

Step 1: Use the MAX TORQUE AVAILABLE DUAL-ENGINE, item 4, CRUISE data. Record this value for **MAX R/C - … / TORQUE.** Subtract the torque value found in MAX END - … / TORQUE, item 10 above from the MAX R/C - … / TORQUE to find the TORQUE INCREASE – PER ENGINE - % TRQ.

Step 2: Use the CLIMB/DESCENT charts in the -10, Chapter 7, Section VII. Enter the bottom of the CLIMB/DESCENT chart for clean or high drag, as appropriate, at the TORQUE INCREASE – PER ENGINE - % TRQ using the value from Step 1 above.

Step 3: Move up to the GROSS WEIGHT ~ 1000 LB line from item 3 DEPARTURE data, then move left to read the RATE OF CLIMB ~ FT/MIN.

Step 4: Use the AIRSPEED SYSTEM CORRECTIONS charts in the -10, Chapter 7, Section IX. Enter the appropriate AIRSPEED SYSTEM CORRECTION chart for clean or high drag at the MAX END – IAS / … from item 10 above. Move up to the appropriate segmented line for the rate of climb value derived from Step 3 above (R/C GREATER OR LESS THAN 1400 FT/MIN).

Step 5: Move left to read the CORRECTION TO ADD ~ KNOTS. Add or subtract this value to/from the MAX END – IAS / … item 10. Record the resultant **MAX R/C – IAS / …**.

(12) MAX ALLOWABLE GWT and OPTIMUM IAS AT MAX ALLOWABLE GWT (DUAL-ENGINE). Use the appropriate CRUISE chart to compute the maximum allowable gross weight and optimum indicated airspeed at maximum allowable gross weight as described below.

(a) Clean and high drag configuration.

Step 1: Enter the bottom of the CRUISE chart at the MAX TORQUE AVAILABLE, item 4, CRUISE data.

Step 2: Move up to the intersection of MAXIMUM END AND R/C line then read the indicating maximum gross weight. Record **DUAL-ENGINE MAX ALLOWABLE GWT**. Read left or right for optimum indicated airspeed (IAS ~ KTS) at maximum allowable gross weight. Record **DUAL-ENGINE OPTIMUM IAS AT MAX ALLOWABLE GWT**. If the maximum torque available line is right of the gross weight lines, enter maximum gross weight according to the -10, Chapter 5 limits then read left or right from the respective value for optimum indicated airspeed at that maximum allowable gross weight.

(b) Alternative or external load configuration.

NOTE: The dual-engine maximum allowable gross weight and optimum indicated airspeed at maximum allowable gross weight are adjusted for alternate or external load configuration as follows.

Step 1: Enter the CRUISE chart at the optimum indicated airspeed at maximum allowable gross weight, (a) step 2 above, then read left or right to the curved dashed line. Move up to read Δ TRQ ~ % FOR DRAG AREA OF 10 SQ FT of ΔF.

Step 2: Multiply the Δ TRQ times the drag multiplying factor. Subtract the result from the maximum torque available value used initially in (a) step 1 above.

Step 3: Reenter the bottom of the CRUISE chart at the adjusted torque value then move up to the intersection of MAX END AND R/C line. Read maximum gross weight and optimum IAS at maximum allowable gross weight. Record the adjusted **DUAL-ENGINE MAX ALLOWABLE GWT** and **OPTIMUM IAS AT MAX ALLOWABLE GWT**. If the adjusted torque value is right of the gross weight lines, enter maximum gross weight according to the -10, Chapter 5 limits then read left or right from the respective value for optimum indicated airspeed at that maximum allowable gross weight.

(13) MIN / MAX Vh – IAS (SINGLE-ENGINE). Use the appropriate CRUISE chart to compute the minimum/maximum Vh indicated airspeeds single-engine, as described below.

(a) Clean and high drag configuration.

Step 1: Enter the bottom of the CRUISE chart at one-half the maximum torque available for the low ETF engine, item 4 above, but no more than one-half of transmission torque limit single-engine.

Step 2: Move up to the first intersection of the AIRCRAFT GWT, item 3, DEPARTURE data then read left or right for minimum Vh IAS ~ KTS. Record the **SINGLE-ENGINE MIN / ... Vh – IAS**.

Step 3: Continue up to the second intersection of the AIRCRAFT GWT, item 3, DEPARTURE data then read left or right for maximum Vh IAS. Record the **SINGLE-ENGINE ... / MAX Vh – IAS**.

NOTE: If the maximum torque available line is to the left of (does not intersect) the AIRCRAFT GWT, item 3, DEPARTURE data, the aircraft cannot maintain single-engine level flight for the conditions. Item 18 must be computed. As fuel is burned, single-engine capability during the flight may be possible.

(b) Alternative or external load configuration.

NOTE 1: The torque change to compensate for drag (alternative or external load configuration) at minimum Vh IAS is often negligible and not computed.

NOTE 2: The maximum Vh indicated airspeed, single-engine, is adjusted for alternate or external load configuration as follows:

Step 1: Enter the CRUISE chart at maximum Vh IAS ~ KTS, (a) step 3, above, then move left or right to the curved dashed line. Move up to read Δ TRQ ~ % FOR DRAG AREA OF 10 SQ FT of ΔF.

Step 2: Multiply the Δ TRQ times the drag multiplying factor. Subtract the result from the maximum torque available value used initially in (a) step 1 above.

Step 3: Reenter the bottom of the CRUISE chart at one-half the adjusted torque value and move up to the second intersection of the AIRCRAFT GWT, item 3, DEPARTURE data. Read left or right for maximum Vh IAS. Record the adjusted **SINGLE-ENGINE .../MAX Vh – IAS**.

(14) CRUISE SPEED – IAS / TAS (SINGLE-ENGINE). Select an IAS that falls within the range of MIN / MAX Vh – IAS, item 13 above. Convert to TAS as described in item 7 above.

NOTE: Do not confuse single-engine cruise speed with emergency single-engine airspeed. The emergency single-engine airspeed is the speed used immediately following an emergency that requires adjustment to a single-engine airspeed. Single-engine cruise speed and associated data is used in the pre-mission planning process. In the event an engine fails, malfunctions or must be shut down, and single-engine operations are possible but landing is not practical (such as over water, jungle, densely forested areas, mountainous terrain or other impractical landing areas), the single-engine cruise speed may be used after establishing emergency single-engine speed when required to reach the intended landing area. The single-engine cruise speed may, in some instances, equal the emergency single-engine speed.

(15) CRUISE/CONTINUOUS TORQUE (SINGLE-ENGINE). Use the appropriate CRUISE chart to compute torque required for cruise and continuous torque (single-engine), as described below.

(a) Clean and High Drag configuration.

Step 1: Enter the CRUISE chart at the selected single-engine cruise IAS, item 14 above. Move left or right as appropriate to the aircraft GW ~ 1000 LB, item 3, DEPARTURE data.

Step 2: Move down to the TORQUE PER ENGINE ~ % line to read the CRUISE torque, then double the torque value. Record the **SINGLE-ENGINE CRUISE/... TORQUE**.

Step 3: Reenter the CRUISE chart at the selected CRUISE – IAS in item 14 above. Move left or right as appropriate to the TORQUE AVAILABLE - CONTINOUS line.

Step 4: Move straight down (do not follow the slant of the line) to the TORQUE PER ENGINE ~ % to read the CONTINUOUS torque. Record the **SINGLE-ENGINE .../CONTINUOUS TORQUE**. .

NOTE 1: If the selected CRUISE ~ IAS line is below the depicted TORQUE AVAILABLE – CONTINOUS line, use the torque value indicated by the lowest extreme of the TORQUE AVAILABLE ~ CONTINUOUS line.

NOTE 2: Adjust CRUISE / CONTINUOUS TORQUE for planned use of engine anti-ice and/or heater.

(b) Alternative or external load configuration.

Step 1: Enter the appropriate CRUISE chart at the selected single-engine cruise IAS in item 14 above the move left or right to the curved dashed line. Move up to read the Δ TRQ ~ % FOR DRAG AREA OF 10 SQ FT OF ΔF.

Step 2: Multiply the Δ TRQ ~ % by the drag multiplying factor.

Step 3: Add or subtract the value in step 2 to/from the uncorrected clean or high drag cruise/continuous torque values in (a) steps 2 and 4 above, then double the torque value (do not exceed the single-engine transmission torque limit). Record the adjusted **SINGLE-ENGINE CRUISE / CONTINUOUS TORQUE**.

NOTE: If the adjusted torque value exceeds the single-engine transmission torque limit, use the single-engine transmission torque limit and adjust cruise airspeed.

(16) CRUISE FUEL FLOW (SINGLE-ENGINE).

(a) Cruise chart method. Use the appropriate CRUISE chart.

Step 1: Enter the bottom of the chart at the torque value computed in item 15 above.

Step 2: Move up to TOTAL FUEL FLOW ~ 100 LB/HR and read the cruise fuel flow. Divide the cruise fuel flow value in half. Record the **SINGLE-ENGINE CRUISE FUEL FLOW**.

NOTE: Adjust as required for planned use of engine anti-ice and cockpit heater according to the -10.

(b) Engine fuel flow chart method. Use the SINGLE/DUAL-ENGINE FUEL FLOW chart.

Step 1: Enter the chart at the INDICATED TORQUE PER ENGINE ~ % for the cruise torque value computed in item 15 above.

Step 2: Move right to the cruise PRESSURE ALTITUDE ~ 1000 FT.

Step 3: Move down to the SINGLE-ENGINE FUEL FLOW ~ LB/HR line and read fuel flow value. Record the **SINGLE-ENGINE CRUISE FUEL FLOW**.

NOTE: Adjust as required for FAT and/or planned use of engine anti-ice and cockpit heater according to the -10.

(17) MAX ALLOWABLE GWT and OPTIMUM IAS AT MAX ALLOWABLE GWT (SINGLE-ENGINE). Use the appropriate CRUISE chart to compute the maximum allowable gross weight, and optimum indicated airspeed at maximum allowable gross weight, single-engine, as described below.

(a) Clean and high drag configuration.

Step 1: Enter the bottom of the CRUISE chart at one-half the SINGLE-ENGINE MAX TORQUE AVAILABLE, item 4, CRUISE data, for the low ETF engine, but no more than one-half of transmission torque limit single-engine.

Step 2: Move up to the intersection of MAX END AND R/C line then read the indicating maximum allowable gross weight. Record the **SINGLE-ENGINE MAX ALLOWABLE GWT**. Read left or right for optimum IAS ~ KTS at maximum allowable gross weight. Record the **SINGLE-ENGINE OPTIMUM IAS AT MAX ALLOWABLE GWT**.

NOTE: If the torque used does not intersect aircraft gross weight, the aircraft cannot maintain single-engine level flight for the conditions. Item 18 must be computed. As fuel is burned, single-engine capability during the flight may be possible.

(b) Alternative or external load configuration.

NOTE 1: The single-engine maximum allowable gross weight and optimum indicated airspeed at maximum allowable gross weight are adjusted for alternate or external load configuration as follows:

Step 1: Enter the CRUISE chart at the optimum indicated airspeed at maximum allowable GWT, step 2 above. Read left or right to the curved dashed line then move up to read Δ TRQ ~ % FOR DRAG AREA OF 10 SQ FT of ΔF.

Step 2: Multiply the Δ TRQ times the drag multiplying factor. Subtract the result from the maximum torque available value used initially in (a) step 1 above.

Step 3: Reenter the bottom of the CRUISE chart at one-half the adjusted torque value then move up to the intersection of MAX END AND R/C line. Read maximum allowable gross weight and optimum IAS at maximum allowable gross weight. Record the adjusted **SINGLE-ENGINE MAX ALLOWABLE GWT** and **OPTIMUM IAS AT MAX ALLOWABLE GWT**.

NOTE 2: If the adjusted torque value does not intersect the AIRCRAFT GWT, item 3, DEPARTURE data, the aircraft cannot maintain single-engine level flight for the conditions. Item 18 must be computed. As fuel is burned, single-engine capability during the flight may be possible.

(18) MAX ALTITUDE – MSL. When cruise flight, dual and/or single-engine, is not possible at the planned cruise pressure altitude, item 1, CRUISE data, use the appropriate CRUISE chart to compute the maximum altitude MSL as described below.

NOTE: Several different cruise charts may be referenced when selecting an optimum maximum cruise altitude, using a variety of temperature, altitude, aircraft gross weight and cruise IAS combinations.

(a) Dual-engine.

Step 1: Enter the appropriate cruise chart at the maximum torque available for that chart. Move up to the second intersection of the aircraft gross weight, item 3, DEPARTURE data.

Step 2: Move left or right to read the IAS ~ KTS. If the indicated IAS ~ KTS is less than the planned cruise IAS, adjust planned temperature, altitude, IAS and/or gross weight combinations to find a suitable cruise altitude. Record the **DUAL-ENGINE MAX ALTITUDE – MSL**.

(b) Single-engine.

NOTE 1: When the capability to maintain level flight after an engine failure or malfunction is not possible, continued flight may be possible by descending to a lower pressure altitude. Adjust to the appropriate maximum endurance indicated airspeed and adjust collective to the maximum torque available to attain minimum rate of descent as required.

Step 1: Enter the appropriate CRUISE chart at one half of the SINGLE-ENGINE MAX TORQUE AVAILABLE, item 4, CRUISE data, of the lowest ETF engine.

Step 2: Move up until intersecting the MAX END AND R/C line and interpolate the maximum gross weight. If the interpolated maximum gross weight is less than the aircraft gross weight, item 3, DEPARTURE data, progressively use lower altitude/temperature combination CRUISE charts until interpolated gross weight is at or greater than the aircraft gross weight. Record the **SINGLE-ENGINE MAX ALTITUDE – MSL**.

WARNING: If allowable altitude/temperature combination cruise charts do not yield a gross weight greater than/or equal to the AIRCRAFT GWT, item 3, DEPARTURE data, level flight is not possible. Record NA in item 18.

NOTE 2: Changes in maximum torque available due to changes in pressure altitude and temperature may be derived from the -CL tabular performance data.

(19) EMERGENCY SE – IAS. This value is the emergency single-engine airspeed based on the mission and briefed to the crew for the purpose of crew coordination. This airspeed is selected from the MIN / MAX Vh - IAS range computed in item 13, CRUISE data and is used immediately following an emergency that requires adjustment to a single-engine airspeed. When an aircraft does not have single-engine capability, the MAX END - IAS, item 10, or the OPTIMUM IAS AT MAX ALLOWABLE GWT, item 17, as appropriate, should be briefed as the emergency single-engine airspeed.

NOTE 1: Normally only one EMERGENCY SE – IAS is selected. However, when the MIN / MAX Vh – IAS range, item 13, is wide, the crew may select two emergency single engine airspeeds, one slow and one fast based on mission profile, modes of flight, environmental conditions or other factors.

NOTE 2: There is no power margin available when operating single-engine at the MIN / MAX Vh - IAS, item 13. These airspeeds are computed using the maximum torque available single-engine for the lowest ETF engine. It is not recommended that the aircraft be flown at airspeeds that require maximum power for continued single-engine flight.

(20) MAX ANGLE. Use the AIRSPEED FOR ONSET OF BLADE STALL chart in the -10, Chapter 5, to compute the maximum bank angle for the planned cruise IAS as described below.

Step 1: Enter the chart at the cruise PRESSURE ALTITUDE ~ 1000 FT. Move right to the cruise temperature FAT °C.

Step 2: Move down to the aircraft GROSS WEIGHT ~ 1000 LBS, item 3 (plus sling load weight, item 6, if applicable), DEPARTURE data then move left to the ANGLE OF BANK ~ DEG chart.

Step 3: Reenter the chart at the INDICATED AIRSPEED ~ KTS at the planned cruise airspeed, item 7 above, then move up to the ANGLE OF BANK ~ DEG chart. Record derived **MAX ANGLE** or 60° whichever is less.

(21) Vne - IAS. Use the appropriate AIRSPEED OPERATING LIMITATIONS chart of the -10, Chapter 5, to compute the velocity not to exceed as described below.

Step 1: Enter the chart at the cruise FREE AIR TEMPERATURE ~ °C. Move right to the cruise PRESSURE ALTITUDE ~ FT.

Step 2: Move down to the aircraft GROSS WEIGHT ~ LBS, item 3 (plus sling load weight, item 6, if applicable), DEPARTURE data. If the COMPRESSIBILITY LIMITS ~ FAT or the MACH LIMIT dashed temperature line (-10 to -50 °C) is reached prior to the aircraft GROSS WEIGHT ~ LBS, stop there.

Step 3: Move left to the MAXIMUM INDICATED AIRSPEED (VNE) ~ KNOTS line for the Vne value. Record **Vne-IAS**.

g. ARRIVAL. Complete this section if arrival conditions at destination differ significantly from departure conditions as defined in paragraph 2b above.

(1) PA. Record forecast pressure altitude for time of arrival. If unavailable, use maximum forecast pressure altitude for the mission.

(2) FAT. Record forecast temperature for time of arrival. If unavailable, use maximum forecast temperature for the mission.

(3) LANDING GWT. Record the estimated gross weight for arrival.

(4) TR. Compute the torque ratios for dual- and single-engine the same as item e(8), DEPARTURE data, using arrival temperature and pressure altitude.

(5) MAX TORQUE AVAILABLE. Compute maximum torque available for dual- and single-engine the same as item e(9), DEPARTURE data, using arrival forecast pressure altitude and temperature.

NOTE 1: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the -10.

NOTE 2: This information can also be derived from the tabular performance data in the -CL.

(6) PREDICTED HOVER TORQUE. Compute the predicted hover torque the same as item e(13), DEPARTURE data, using arrival forecast pressure altitude and temperature.

(7) MAX ALLOWABLE GWT OGE/IGE. Compute the maximum allowable gross weight the same as item e(10), DEPARTURE data, using arrival forecast pressure altitude and temperature.

(8) MAX HOVER HEIGHT IGE. If OGE capability does not exist, compute the maximum hover height IGE the same as item e(12), DEPARTURE data, using arrival forecast pressure altitude and temperature.

(9) MIN SE – IAS - W/O STORES / W/STORES. Compute the minimum single-engine airspeed with external stores and without external stores the same as item e(14), DEPARTURE data, using arrival forecast pressure altitude and temperature.

h. Updates. The PPC may be updated in flight or on the ground as the mission progresses. Updates are required when there is an intent to land and/or takeoff and when operating within 3,000 pounds of the MAX ALLOWABLE GWT (OGE), there is an increase of 500-feet pressure altitude, and/or 5 °C from the planned PPC.

(1) AIRCRAFT WEIGHT. Update the aircraft weight as described below.

(a) When internal and/or external load weights have not changed. Add the total remaining indicated fuel weight (internal/external) to the zero fuel weight computed, item 15, DEPARTURE data.

(b) When internal and/or external load weights have changed. Perform a hover check to determine a readjusted zero fuel weight as described in item e(15), DEPARTURE data.

NOTE: The tabular performance data in the back of the -CL will be used for the following computations.

(2) MAX TORQUE AVAILABLE. Use the appropriate tabular performance data MAXIMUM TORQUE AVAILABLE table as described in Figure 6-3.

Step 1: Enter the table at the appropriate HP~FT (pressure altitude) and move right to the ATF 1.0 or 0.9 value as required.

Step 2: Continue right to the appropriate FREE AIR TEMPERATURE ~ °C column. Read MAX TORQUE AVAILABLE.

NOTE 1: See tabular performance data examples in Figure 6-3.

NOTE 2: The ATFs shown on the chart are 1.0 and 0.9. If the aircraft has an ATF between these values, interpolation is required.

(3) MAX ALLOWABLE GWT OGE. Use the APPROPRIATE MAXIMUM OGE HOVER WEIGHT AND TORQUE REQUIRED table as described below.

Step 1: Enter the table at the appropriate HP ~ FT (pressure altitude) and move right to the GW ~ 100 LB line.

Step 2: Continue right to the appropriate FREE AIR TEMPERATURE ~ °C column. Multiply the indicated value by 100 to determine the MAX ALLOWABLE GWT OGE.

Step 3: Move down to Q ~ OGE ~ % line. Read torque required to hover OGE, at the MAX ALLOWABLE GWT OGE.

NOTE : See tabular performance data examples in Figure 6-4.

(4) GO/NO-GO OGE. Use the appropriate MAXIMUM OGE HOVER WEIGHT AND TORQUE REQUIRED table as described below.

Step 1: Enter the table at the appropriate HP ~ FT (pressure altitude) and move right to the Q ~ IGE ~ % line.

Step 2: Continue right to the appropriate FREE AIR TEMPERATURE ~ °C column. Read the GO/NO-GO OGE torque value. This is also the torque required to hover IGE, at the MAX ALLOWABLE GWT OGE.

NOTE: See tabular performance data examples in Figure 6-4.

i. Tabular Performance Data. The following examples are provided to explain the tabular performance data presented in the -CL.

MAXIMUM TORQUE AVAILABLE* - 30 MINUTE LIMIT
ANTI-ICE OFF T700-GE-700 ENGINE (CONTINUED)

HP ~FT	ATF	FREE AIR TEMPERATURE ~ °C						
		-15	-10	-5	0	5	10	15
8000	1.0	89	90	90	90	88	85	84
	0.9	89	88	86	85	83	81	78

Pressure Altitude (PA)

ATF – If the aircraft ATF is between 0.9 and 1.0, Interpolate the maximum torque available as described below.

Free air temperature (FAT)

EXAMPLE: UH-60A/Q
PA: +8000'
ATF: 0.96
FAT: +10°C

96 is 6/10 of the difference between ATF .90 (0.9) and 1.00 (1.0)

Maximum Torque Available

85 – 81 = 4 % TRQ
4 X 6/10 = 2.4 % TRQ
81 + 2.4 = 83.4 % maximum torque available

Figure 6-3. Maximum torque available chart.

MAXIMUM OGE HOVER WEIGHT AND TORQUE REQUIRED
ANTI-ICE OFF T700-GE-700 ENGINE (CONTINUED)

HP ~FT	ATF *	FREE AIR TEMPERATURE ~°C							
		10		15		20		25	
		1.0	0.9	1.0	0.9	1.0	0.9	1.0	0.9
8000	GW ~ 100 LB	173	166	169	162	166	157	162	152
	Q ~ OGE ~ %	85	81	84	78	82	75	79	72
	Q ~ IGE ~ %	73	69	71	67	70	64	67	62

GW ~ 100 LB (aircraft gross weight) – Multiply this value times 100.

Q ~ OGE ~ % (torque required to hover OGE at 100-feet wheel height) at maximum allowable gross weight OGE above (GW ~100 LB).

Q ~ IGE ~ % (torque required to hover IGE at 10-feet wheel height) at maximum allowable gross weight OGE above (GW ~100 LB).

EXAMPLE: UH-60A/Q

PA: +8000'
ATF: 0.96
FAT: +10°C

.96 is 6/10 of the difference between ATF .90 (0.9) and 1.00 (1.0)

GW~100 LB

Maximum allowable gross weight OGE, (0.9): 166 X 100 = 16,600, (1.0): 173 X 100 = 17,300 pounds.
17,300 – 16,600 = 700 pounds
700 X 6/10 = 420 pounds
16600 + 420 = 17,020 pounds maximum allowable gross weight OGE

Q~OGE~%

85 – 81 = 4 % TRQ
4 X 6/10 = 2.4 % TRQ
81 + 2.4 = 83.4 % TRQ required to hover 17,020 pounds OGE

Q~IGE~%

73 – 69 = 4 % TRQ
4 X 6/10 = 2.4 %, TRQ
69 + 2.4 = 71.4 % TRQ required to hover 17,020 pounds IGE

71.4% TRQ is also the GO/NO-GO OGE

Figure 6-4. Maximum OGE hover weight and torque required chart.

UH-60 PERFORMANCE PLANNING CARD

For use of this form, see TC 1-212: The proponent agency is TRADOC.

DEPARTURE

AIRCRAFT GWT: **(3)** lbs	PA: **(1)** / **(1)**		FAT: **(2)** °C / **(2)** °C	
FUEL WEIGHT: **(4)** lbs	DUAL-ENGINE		SINGLE-ENGINE	
STORES WEIGHT: **(5)** lbs			#1	#2
SLING WEIGHT: **(6)** lbs	ATF: **(7)**		ETF: **(7)**	ETF: **(7)**
ZERO FUEL WEIGHT: **(15)** lbs	TR: **(8)**		TR: **(8)**	TR: **(8)**
MAX TORQUE AVAILABLE	**(9)** %		**(9)** %	**(9)** %
MAX ALLOWABLE GWT OGE / IGE	**(10)** / **(10)**			
GO/NO-GO TORQUE OGE / IGE	**(11)** % / **(11)** %			
MAX HOVER HEIGHT IGE	**(12)** ft			
PREDICTED HOVER TORQUE	**(13)** %		**(13)** %	**(13)** %
MIN SE-IAS - W/O STORES / W/STORES			**(14)** kts / **(14)** kts	

REMARKS: **(16)**

CRUISE

PA: **(1)** ft	FAT: **(2)** °C	MAX ANGLE: **(20)** °	Vne-IAS: **(21)** kts	
		DUAL-ENGINE	SINGLE-ENGINE	
			#1	#2
		TR: **(3)**	TR: **(3)**	TR: **(3)**
MAX TORQUE AVAILABLE	CT **(5)** %	**(4)** %	**(4)** %	**(4)** %
MIN / MAX Vh - IAS		**(6)** kts/ **(6)** kts	**(13)** kts / **(13)** kts	
CRUISE - IAS / TAS		**(7)** / **(7)**	**(14)** kts/ **(14)** kts	
CRUISE / CONTINUOUS TORQUE		**(8)** %/ **(8)** %	**(15)** %/ **(15)** %	
CRUISE FUEL FLOW		**(9)** pph	**(16)** pph	
MAX END - IAS / TORQUE		**(10)** kts/ **(10)** %		
MAX RANGE - IAS / TORQUE		**(10)** kts/ **(10)** %		
MAX R/C - IAS / TORQUE		**(11)** kts/ **(11)** %		
MAX ALLOWABLE GWT		**(12)** lbs	**(17)** lbs	
OPTIMUM IAS AT MAX ALLOWABLE GWT		**(12)** kts	**(17)** kts	
MAX ALTITUDE - MSL		**(18)** ft	**(18)** ft	
EMERGENCY SE - IAS			**(19)** kts	

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Figure 6-5. Sample UH-60 Performance Planning Card (front).

ARRIVAL			
LANDING GWT: **(3)** lbs	PA: **(1)** ft	FAT: **(2)** °C	
	DUAL-ENGINE	SINGLE-ENGINE #1	#2
	TR: **(4)**	TR: **(4)**	TR: **(4)**
MAX TORQUE AVAILABLE	**(5)** %	**(5)** %	**(5)** %
PREDICTED HOVER TORQUE	**(6)** %	**(6)** %	**(6)** %
MAX ALLOWABLE GWT OGE / IGE	**(7)** / **(7)**		
MAX HOVER HEIGHT IGE	**(8)** ft		
MIN SE-IAS - W/O STORES / W/STORES		**(9)** kts / **(9)** kts	
REMARKS:			

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Figure 6-6. Sample UH-60 Performance Planning Card (back).

GLOSSARY

ACE	analysis control element
ACFT	aircraft
ACP	air control point
ADF	automatic direction finder
AFCS	automatic flight control system
AGL	above ground level
AH	attack helicopter
AHO	above highest obstacle
AIM	Aeronautical Information Manual
ALSE	aviation life support equipment
ALTR	alternate
AMC	air mission commander
△AMCOM	Aviation and Missile Command (U.S. Army)
ANVIS	aviator's night vision imaging system
APART	annual proficiency and readiness test
APU	auxiliary power unit
AR	Army regulation
ARNG	Army National Guard
ARTEP	Army training and evaluation program
ASE	aircraft survivability equipment
ASET	aircrew survivability equipment trainer

ASR	airport surveillance radar
ATC	air traffic control
ATF	aircraft torque factor
ATIS	automatic terminal information service
ATM	aircrew training manual
ATP	aircrew training program
ATTN	attention
AZ	Arizona
BDHI	bearing-distance-heading indicator
BII	basic issue items
BITE	built-in test equipment
△C	Celsius
C&E	communication/electronics
CDU	central display unit
CE	crew chief (maintenance personnel)
CG	center of gravity
CIS	command instrument system
CL	checklist
COMPT	compartment
CONT	continuous
CONUS	continental United States
CP	communications process; control point
CPCI	communications processor control indicator
CPU	central processing

CTR	crew training record
DA	Department of the Army
DAC	Department of the Army civilian
DD	Department of Defense (applies to form)
DEC	digital electronic control
DECU	digital electronic control unit
D/F	direction finder
DF	direction finding
DFCU	direction finding control unit
△DEG	degree
DH	decision height
DIR	direct
DMF	drag multiplying factor
DOD	Department of Defense
EA	electronic attack
ECCM	electronic counter-countermeasures
ECU	electrical control unit
EH	electronic helicopter
EMER	emergency
EMS	emergency medical service
END	endurance
ENG	engine
ERFS	extended range fuel system

ESSS	external store support system
ETA	estimated time of arrival
ETE	estimated time en route
ETF	engine torque factor
ETL	effective translational lift
ETP	exportable training packet
F	Fahrenheit
FAA	Federal Aviation Administration
FAC	flight activity category
FAR	Federal Aviation regulation
FAT	free air temperature
FI	nonrated crew member instructor
FIH	Flight Information Handbook
FLIP	flight information publication
FM	field manual; frequency modulated
FPM	feet per minute
FPS	flight path stabilization
FS	flight simulator
ft	feet
FW	fixed wing
GEN	generator
GPS	global positioning system
GR	grade
GWT	gross weight

HDG	heading
Hg	mercury
HIRSS	Hover Infrared Suppressor System
HIT	health indicator test
HQ	headquarters
hr	hour
HSI	horizontal situation indicator
HUD	heads-up display
I	instructor
IAS	indicated airspeed
IATF	individual aircrew training folder
ICAO	International Civil Aviation Organization
ICS	intercommunication system
ID	identification
IE	instrument examiner
IFF	identification, friend or foe (radar)
IFR	instrument flight rules
IGE	in-ground effect
IINS	integrated inertial navigation system
ILS	instrument landing system
IMC	instrument meteorological conditions
IOP	interoperability
IP	instructor pilot

IR	infrared
△IRP	intermediate rated power
IV	intravenous
KIAS	knots indicated airspeed
kt	knot
KTAS	knots true airspeed
KTS	knots
LOB	lines-of-bearing
LOC	localizer
LS	left seat
LSE	landing signalman enlisted
LZ	landing zone
MAP	missed approach point
max	maximum
△MCP	maximum continuous power
MCS	master control station
ME	maintenance test flight evaluator
MEDEVAC	medical evacuation
METL	mission essential task list
METT-T	mission, enemy, terrain, troops, and time available
MIJI	meaconing, intrusion, jamming, and interference
min	minimum
MO	flight medic or other medical personnel
MOPP	mission-oriented protective posture

MOS	military occupational specialty
MOU	memorandum of understanding
MP	maintenance test pilot
△MSL	mean sea level
MTF	maintenance test flight
N	night
NA	not applicable; ungraded (for grade slip purposes)
NAS	National Airspace System
NATO	North Atlantic Treaty Organization
NAV	navigation
NAVAID	navigational aid
NBC	nuclear, biological, chemical
NCM	nonrated crew member
NDB	nondirectional beacon
Ng	engine gas generator speed
NGR	National Guard regulation
no	number
NOE	nap of the earth
NORM	normal
NOTAM	notice to airmen
Np	engine power turbine speed
NVD	night vision device
NVG	night vision goggles
NVS	night vision system

OGE	out-of-ground effect
P	pilot not on the controls
P*	pilot on the controls
PA	pressure altitude
pam	pamphlet
PAR	precision approach radar
PC	pilot in command
PCL	power control lever
PDU	pilot's display unit
PI	pilot
PMS	preventive maintenance service
PNVS	pilot night vision system
POI	program(s) of instruction
POS	position
PPC	performance planning card
psi	pounds per square inch
PTT	push to talk
pub	publication
PZ	pickup zone
R	reproducible
R/C	rate of climb
RCM	rated crew member
RCU	receiver control unit
REL	release

RF	radio frequency
RFI	radio frequency interference
RL	readiness level
ROM	read only memory
ROS	remote out station
ROZ	restricted operating zone
RPM	revolutions per minute
RPM R	revolutions per minute rotor
RS	right seat
RW	rotary wing
SALUTE	size, activity, location, unit, time, equipment
SAS	stability augmentation system
SAT	systems approach to training
SDU	signal display unit
△SE	single-engine
SEL	select; selection
SFTS	synthetic flight training systems
SI	nonrated crew member standardization instructor
SIF	selective identification feature
SINCGARS	single-channel ground and air radio system
SKED	(company trade name for litter)
SM	statute mile
SM-TG	soldier's manual-trainer's guide
SOI	signal operation instructions

SOP	standing operating procedure
SP	standardization instructor pilot
sq	square
SSN	social security number
STAB	stabilator
STABO	a system for extracting personnel by helicopter (the combined first letters of the surnames of the five persons who designed the system)
STANAG	standardization agreement
std	standard
STP	soldier training publication
sys	system
TADS	target acquisition and designation system
TAS	true airspeed
TB	technical bulletin
TC	training circular
TGT	turbine gas temperature
TM	technical manual
TR	torque ratio
TRADOC	United States Army Training and Doctrine Command
△TRQ	torque
UH	utility helicopter
UH-60FS	UH-60 flight simulator
UHF	ultra high frequency
US	United States (of America)
USAAVNC	United States Army Aviation Center

USAF	United States Air Force
USAR	United States Army Reserve
USARI	United States Army Research Institute
UT	unit trainer
VFR	visual flight rules
Vh	maximum speed in level flight with maximum power
VHF	very high frequency
VMC	visual meteorological conditions
Vne	velocity never exceed (airspeed limit)
VOR	VHF omnidirectional range
VSI	vertical speed indicator
WB	wideband
WX	weather
XFD	cross-feed
Z/Zulu	coordinated universal time (UTC)

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INDEX

This index is organized alphabetically by topics and subtopics identified by page numbers.

UH-60 PERFORMANCE PLANNING CARD

For use of this form, see TC 1-212: The proponent agency is TRADOC.

DEPARTURE

AIRCRAFT GWT: lbs	PA: /	FAT: °C / °C		
FUEL WEIGHT: lbs	DUAL-ENGINE	SINGLE-ENGINE		
STORES WEIGHT: lbs		#1	#2	
SLING WEIGHT: lbs	ATF:	ETF:	ETF:	
ZERO FUEL WEIGHT: lbs	TR:	TR:	TR:	
MAX TORQUE AVAILABLE	%	%	%	
MAX ALLOWABLE GWT OGE / IGE	/			
GO/NO-GO TORQUE OGE / IGE	% / %			
MAX HOVER HEIGHT IGE	ft			
PREDICTED HOVER TORQUE	%	%	%	
MIN SE-IAS - W/O STORES / W/STORES		kts / kts		

REMARKS:

CRUISE

PA: ft	FAT: °C	MAX ANGLE: °	Vne-IAS: kts

		DUAL-ENGINE	SINGLE-ENGINE	
			#1	#2
		TR:	TR:	TR:
MAX TORQUE AVAILABLE	CT %	%	%	%
MIN / MAX Vh - IAS		kts/ kts	kts / kts	
CRUISE - IAS / TAS		/	kts/ kts	
CRUISE / CONTINUOUS TORQUE		%/ %	%/ %	
CRUISE FUEL FLOW		pph	pph	
MAX END - IAS / TORQUE		kts/ %		
MAX RANGE - IAS / TORQUE		kts/ %		
MAX R/C - IAS / TORQUE		kts/ %		
MAX ALLOWABLE GWT		lbs	lbs	
OPTIMUM IAS AT MAX ALLOWABLE GWT		kts	kts	
MAX ALTITUDE - MSL		ft	ft	
EMERGENCY SE - IAS			kts	

DA FORM 5703-R

ARRIVAL			
LANDING GWT: lbs	PA: ft	FAT: °C	
	DUAL-ENGINE	SINGLE-ENGINE #1	#2
	TR:	TR:	TR:
MAX TORQUE AVAILABLE	%	%	%
PREDICTED HOVER TORQUE	%	%	%
MAX ALLOWABLE GWT OGE / IGE	/		
MAX HOVER HEIGHT IGE	ft		
MIN SE-IAS - W/O STORES / W/STORES		kts /	kts

REMARKS:

PIN: 64854-001